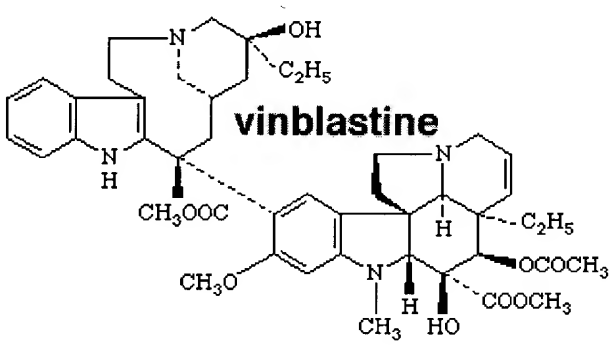
Pharmacology of Vinblastine, Vincristine, Vindesine and Vinorelbine

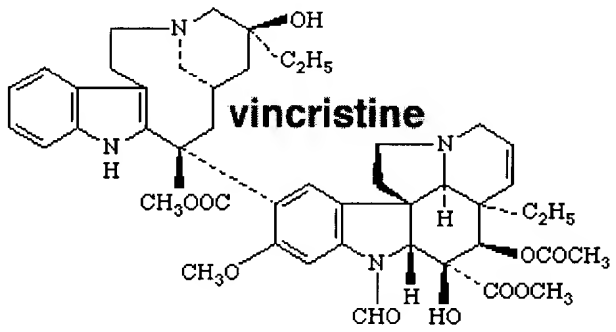
[Chemical Comparison Table | Periwinkle Page]

Vinblastine and **vincristine** are alkaloids found in the Madagascar periwinkle, *Catharanthus roseus* (formerly classified as *Vinca rosea*, which led to these compounds becoming called **Vinca alkaloids**).

They and **vindesine** and **vinorelbine**, semisynthetic derivatives of vinblastine, all work by inhibiting **mitosis** (cell division) in **metaphase**. These alkaloids bind to **tubulin**, thus preventing the cell from making the **spindles** it needs to be able to move its chromosomes around as it divides (this is similar to the action of colchicine, but is different fr om the action of paclitaxel, which interferes with cell division by keeping the spindles from being broken down). These alkaloids also seem to interfere with cells' ability to synthesize **DNA** and **RNA**. They are all administered intravenously in their sulfate form once a week; these solutions are fatal if they're administered any other way, and can cause a lot of tissue irritation if they leak out of the vein. Although these three compounds are very similar in structure and have the same basic action, they have distinctly different effects on the body.



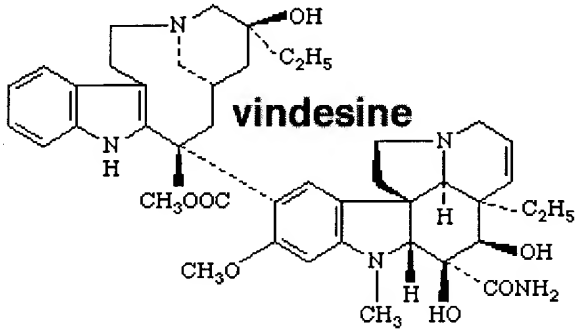
Vinblastine is typically administered at a dose of 6 milligrams per square meter of body surface. It's marketed as Velban by Eli Lilly and has a half-life in the bloodstream of 24 hours. Vinblastine is mainly useful for treating Hodgkin's disease, lymphocytic lymphoma, histiocytic lymphoma, advanced testicular cancer, advanced breast cancer, Kaposi's sarcoma, and Letterer-Siwe disease. It also seems to fight cancer by interfering with glutamic acid metabolism (specifically, the pathways leading from glutamic acid to the Krebs cycle and to urea formation). People with bacterial infections should not be given this drug, nor should pregnant women, since it caused severe birth defects in animal studies. Side effects include hair loss, nausea, lowered blood cell counts, headache, stomach pain, numbness, constipation and mouth sores. Bone marrow damage is the typical dose-limiting factor.



Vincristine, which is marketed as Oncovin by Eli Lilly, has a serum half-life of about 85 hours. It's used mainly to treat acute leukemia, rhabdomyosarcoma, neuroblastoma, Hodgkin's disease and other lymphomas. The typical dose in 1.4 milligrams per square meter of body surface once a week, and neurotoxicity is the dose limiting factor (it can cause damage to the peripheral nervous system). Because of this, people with neuromuscular disorders should steer clear of this drug if possible. Likewise, people with some forms of Charcot-Marie-Tooth syndrome should avoid vincristine. Pregnant women should definitely not take it, because it causes severe birth defects in animal tests. Side effects include those found with vinblastine, plus

nervous system problems such as sensory impairment; some people may also develop breathing problems or lung spasms shortly after the drug is administered. People occasionally develop secondary cancers if they receive the drug along with other anticancer drugs that are known to be carcinogens.

Vindesine has a serum half-life of about 24 hours and is administered at a dose of 3 milligrams per square meter of body surface. Its toxicity and side effects are similar to those of vinblastine. Vindesine, which is marketed under the names Eldisine and Fildesin, is used mainly to treat melanoma and lung cancers (carcinomas) and, with other drugs, to treat uterine cancers.



Vinorelbine is currently in Phase II clinical trials as a treatment for ovarian cancer. It will be marketed as Navelbine by Glaxo Wellcome, Inc., if the trials are successful and the FDA approves the drug. Thus far, vinorelbine seems to have a wider range of antitumor activity than the other vinca alkaloids. In preclinical trials, it showed promise in treating patients with epithelial ovarian cancers and, in combination with the chemotherapy drug cisplatin, in treating patients with non-small-cell lung cancers. The side effects of this drug include diarrhea, nausea, and hair loss; it seems to be less of a nerve poison than vindesine.

For more information, visit:

- Ovarian Cancer Research Notebook: Vinorelbine (Navelbine)
- Vincristine Fact Sheet From the National Cancer Institute
- The Access Project: Vinblastine
- The Access Project: Vincristine
- Understanding Vindesine: Uses and Side Effects

References:

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these pages, or if you have any suggestions or comments.

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